

## **General Disclaimer**

### **One or more of the Following Statements may affect this Document**

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

Report No. 78-084  
NAS8-31949

(NASA-CR-150809) RSX-11D/DX11-B INTERFACE  
USER'S GUIDE (M and S Computing, Inc.,  
Huntsville, Ala.) 25 p HC A02/MF A01

N78-31795

CSCI 09E

63/61 30294  
Unclas

RSX-11D/DX11-B INTERFACE  
USER'S GUIDE

August 23, 1978

Prepared for:

National Aeronautics and Space Administration  
George C. Marshall Space Flight Center  
Marshall Space Flight Center, Alabama 35812

  
**M&S** COMPUTING, INC.

## PREFACE

This manual provides the PDP-11/RSX-11D user with the information necessary to communicate with an IBM 360/370 via a DX11-B interface.

## TABLE OF CONTENTS

| <u>Section</u>                          | <u>Page</u> |
|-----------------------------------------|-------------|
| 1. INTRODUCTION                         | 1           |
| 2. GENERAL INFORMATION                  | 2           |
| 2.1 System Capabilities                 | 2           |
| 2.2 Hardware Components                 | 2           |
| 2.3 Software Components                 | 2           |
| 2.3.1 IBM Application Program           | 2           |
| 2.3.2 Access Method                     | 2           |
| 2.3.3 I/O Supervisor                    | 3           |
| 2.3.4 DX11-B Device Handler             | 3           |
| 2.3.5 RSX-11 Operating System           | 3           |
| 2.3.6 PDP-11 Application Program        | 3           |
| 3. PROGRAMMING GUIDELINES               | 6           |
| 3.1 I/O Request Format                  | 6           |
| 3.1.1 Attach DX11-B                     | 7           |
| 3.1.2 Detach DX11-B                     | 7           |
| 3.1.3 Read DX11-B Data                  | 7           |
| 3.1.4 Write DX11-B Data                 | 7           |
| 3.2 DX11-B Device Handler Error Codes   | 8           |
| 3.3 Event Flag Conventions              | 8           |
| 3.4 Example                             | 9           |
| 4. DX11-B DEVICE HANDLER CONSIDERATIONS | 16          |
| 4.1 Assembling                          | 16          |
| 4.2 Task Building                       | 16          |
| 4.3 Loading/Unloading                   | 16          |
| 4.4 System Generation                   | 17          |

TABLE OF CONTENTS  
(Continued)

| <u>Section</u>             | <u>Page</u> |
|----------------------------|-------------|
| 5. IBM CONSIDERATIONS      | 18          |
| 5.1 Channel Considerations | 18          |
| 5.2 Device Considerations  | 18          |
| 6. PROBLEM CHECKLIST       | 20          |

## 1. INTRODUCTION

The DX interface subsystem controls the transfer of data between the PDP-11 and an IBM 360/370 channel. The subsystem has been designed to provide user interfaces which are comprehensive and easy to use.

This manual provides a functional description of the DX interface subsystem and describes the commands, procedures, and conventions for its use. The manual is divided into the following topics.

Section 2 provides an overview of the subsystem.

Section 3 provides guidelines on writing user programs which communicate with the IBM 360/370 via the DX11-B interface.

Section 4 describes the requirements for maintaining and using the DX11-B Device Handler.

Section 5 discusses considerations for enabling the IBM 360/370 to use the device emulated by the PDP-11/DX11-B.

Section 6 is a guide for isolating system faults.

To aid in the complete understanding of the DX interface, the following documents may be helpful.

- o Digital Equipment Corporation, RSX-11D User's Guide, Report No. DEC-11-ONdua-A-D.
- o Digital Equipment Corporation, RSX-11D FORTRAN Special Subroutines Reference Manual, Report No. DEC-11-LFSMA-B-D.
- o IBM System/370. Principles of Operation, GA22-7000-3.

## 2. GENERAL INFORMATION

This section provides an overview of the DX interface subsystem which links the PDP-11 with an IBM 360/370 via a channel interface.

### 2.1 System Capabilities

The system provides basic read/write services between the IBM 360/370 and the PDP-11.

The PDP-11 emulates an IBM/2848 control unit and a 2260 device. However, additional capabilities have been added to the DX11-B Device Handler which service several channel commands associated with the operation of an IBM/2250 graphics station. This allows the PDP-11 to emulate a "limited-function" IBM/2250 which does not support function key or light pen services. If the PDP-11 is viewed as a 2250 by the IBM software, all non-zero attentions from the PDP-11 must be interpreted as keyboard attentions.

### 2.2 Hardware Components

Figure 2-1 shows the minimum hardware configuration required. The DX11-B can be connected to either a selector, multiplexer, or block multiplexer channel. The DL-11C/Tektronix 4014 interface can be replaced by a compatible teletype interface.

### 2.3 Software Components

Figure 2-2 shows an overview of the software components which compose a general DX communication system. The functions of these components are described below.

#### 2.3.1 IBM Application Program

This is a user-written program which employs the computer's facilities for a specific application.

#### 2.3.2 Access Method

This is a set of macros and/or routines which aid the user in transferring data between memory and an external device. Access methods are normally responsible for translating a user's logical I/O request into the appropriate channel program.

HARDWARE COMPONENTS

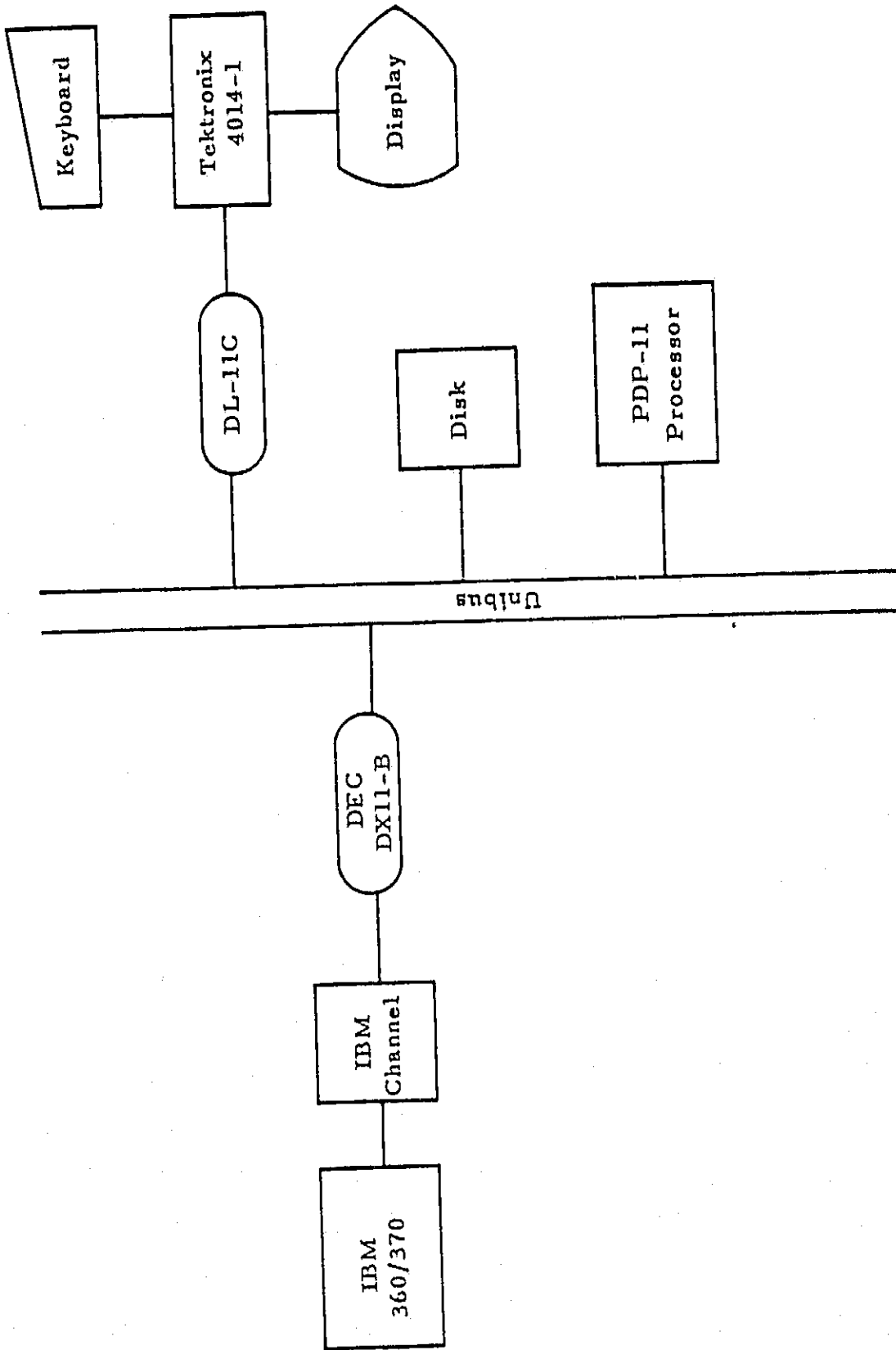


Figure 2-1



# SOFTWARE COMPONENTS

IBM

PDP-11

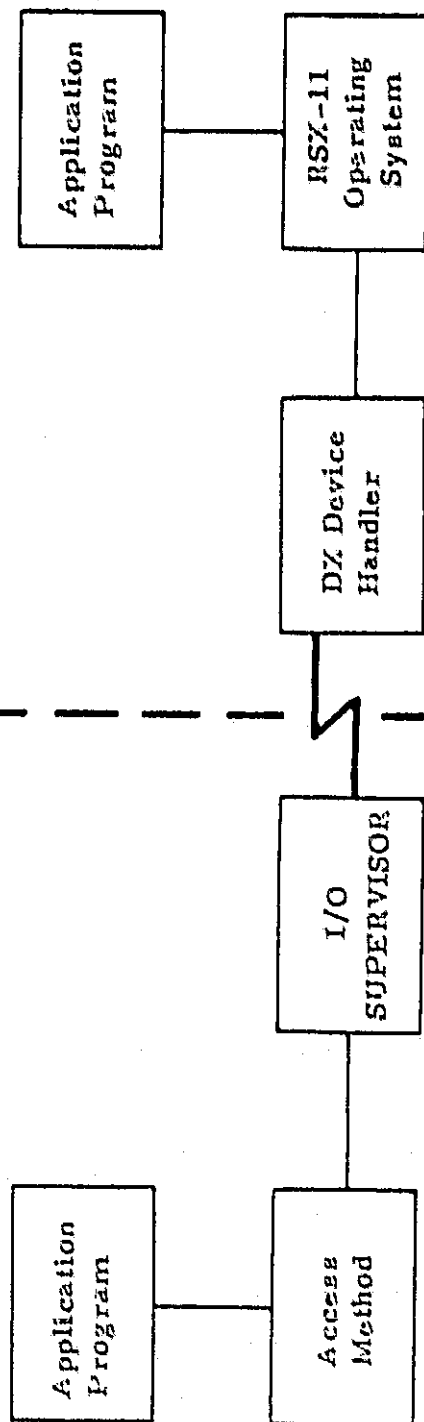


Figure 2-2

### 2.3.3 I/O Supervisor

This is an integral part of the IBM operating system. It controls the scheduling of channel programs, services I/O interrupts, and performs I/O error recovery.

### 2.3.4 DX11-B Device Handler

This software controls the DX11-B device hardware. It processes I/O requests from the PDP-11 application program, processes I/O interrupts from the DX11-B, and performs various control unit functions such as providing sense data and attention signals to the IBM channel.

### 2.3.5 RSX-11 Operating System

This software allocates the resources of the PDP-11 system. In particular, it directs I/O requests to the proper device handler queue, controls task scheduling, and coordinates event notification.

### 2.3.6 PDP-11 Application Program

This is a user-written program which employs the computer's facilities for a specific application.

### 3. PROGRAMMING GUIDELINES

This section provides rules and suggestions for writing PDP-11 application programs which use the DX interface services.

#### 3.1 I/O Request Format

All application program requests to the DN11-B Device Handler are in the form of a standard QIO request. The following symbols are used in defining the QIO requests:

- o LUN - Logical unit number (word).
- o EFN - Event flag number (word).
- o IOSTAT - I/O status block (2 words).
- o AST - Asynchronous system trap (address).
- o BUFFER - I/O buffer ("n" bytes).
- o BYTCT - Byte count (word).
- o IPRM - Device dependent parameter list (6 words).
- o ISW - Directive status return code (1 word).

The function codes (IO.ATT, IO.DET, etc.) used in MACRO-11 interfaces are resolved by the task builder by linking to the executive symbol table. The function code used in the FORTRAN calls must be defined in the user's program. These codes are defined in Appendix I of the RSX-11 I/O Operations Reference Manual.

The WTQIO form of the FORTRAN QIO call results in a synchronous I/O request, i. e., the task is suspended until the I/O request is completed. Hence, there is no need to specify an event flag. The WTQIO form is recommended for attach and detach requests.

If the asynchronous form of the QIO call is specified, the user should specify an event flag number which is used in wait functions to check for I/O completion. In such cases logical combinations of event flags may be specified in various wait functions to allow the user to detect additional conditions. For example, the user can issue a QIO request, followed by a mark time request, and then wait for either the I/O request to complete or the time interval to expire.

### 3.1.1 Attach DX11-B

MACRO-11

QIO\$\$ #IO.ATT,#LUN,,,#IOSTAT

FORTTRAN

CALL [WT]QIO(IOATT,LUN,,,IOSTAT,,ISW)

### 3.1.2 Detach DX11-B

MACRO-11

QIO\$\$ #IO.DET,#LUN,,,#IOSTAT

FORTTRAN

CALL [WT]QIO(ODET,LUN,,,IOSTAT,,ISW)

### 3.1.3 Read DX11-B Data

MACRO-11

QIO\$\$ #IO.RLB,#LUN,#EFN,,#IOSTAT,[#AST],  
<#BUFFER,#BYTCT>

FORTTRAN

CALL GETADR(IPRM(1),BUFFER)

IPRM(2)=BYTCT

CALL [WT]QIO(IORLB,LUN,EFN,,IOSTAT,  
IPRM,ISW)

### 3.1.4 Write DX11-B Data

MACRO-11

QIO\$\$ #IO.WLB,#LUN,#EFN,,#IOSTAT,[#AST],  
<#BUFFER,#BYTCT>

FORTTRAN

CALL GETADR(IPRM(1),BUFFER)

IPRM(2)=BYTCT

CALL [WT]QIO(IOWLB,LUN,EFN,,IOSTAT,IPRM,ISW)

### 3.2 DN11-B Device Handler Error Codes

A successful I/O request will return a value of +1 in the directive status word and the low order eight bits (7-0) of the first word of the I/O status block. An unsuccessful I/O request will return the following codes in the low order eight bits of the first word of the I/O status block.

#### Attach Request

|         |      |                         |
|---------|------|-------------------------|
| IE. DAA | (-8) | Device already attached |
|---------|------|-------------------------|

#### Detach Request

|         |      |                     |
|---------|------|---------------------|
| IE. DNA | (-7) | Device not attached |
|---------|------|---------------------|

#### Read/Write Requests

|         |      |                              |
|---------|------|------------------------------|
| IE. IFC | (-2) | Illegal function code        |
| IE. BAD | (-1) | Bad byte count               |
| IE. SPC | (-6) | Invalid buffer address       |
|         | (-9) | Privilege violation          |
|         | (-3) | DN is off-line               |
|         | (-4) | Conflicting user/IBM request |
|         | (-5) | IBM reset occurred           |

If the error code does not match one of the above, negate the error code and check for combinations of the following:

|     |                     |
|-----|---------------------|
| 20  | Channel termination |
| 40  | IBM HIO             |
| 100 | Parity error        |
| 200 | Nonexistent memory  |

### 3.3 Event Flag Conventions

Read and write requests from the IBM channel are signalled to the PDP-11 application program via global event flags. These flags are set by the DN11-B Device Handler only if the application program does not have the required I/O request pending.

The global event flags should be cleared by the application program upon detecting the event.

The following event numbers are used:

- o 51 (decimal) is used to indicate that the application program should issue a read request (IBM is trying to write).
- o 52 (decimal) is used to indicate that the application program should issue a write request (IBM is trying to read).
- o 53 (decimal) is used to indicate that the channel has terminated an in-progress data transfer (channel termination or HALT I/O).

### 3.4 Example

The example shown in Figure 3-1 illustrates how a user can utilize the DX communication services.

The example shown is a program which routes messages between a Tektronix 4014 device on the PDP-11 and an application program on the IBM 360/370.

If the IBM application program writes data to the device being emulated by the PDP-11, the PDP-11 application program detects the event and issues a read request to the DX11-B. It then writes the received data to the Tektronix 4014. The write-all function code is used since the data from the IBM is known to contain control information for the 4014 hardware.

A QIO read request is kept outstanding to the Tektronix 4014 except when data must be written to it. This read request allows data to be received from the 4014 without knowing whether the displayed message from the IBM is a prompt or an information-only message.

Note that the program writes data to the DX11-B regardless of whether an IBM read event has occurred. In this situation, the DX11-B Device Handler will produce an attention request to the IBM channel to notify the IBM 360/370 that there is data to be read.

The program shown in Figure 3-1 is task built by the following commands:

`DNTEST -C PFX, DNTEST -SP-DNTEST`

`ASG-DXO:1, TFI:2, CCO:3, TR:5`



(Continued)

23-AUG-78

PAGE 4

FORTRAN IV-PLUS V02-51

DATE: 8/23/78

00012 GO TO 80

00013 IF (STAT=1 AND (DXSTAT(1) .NE. 1))

00014 IF (STAT=20, ISSUE) GO TO 50

00015 WRITE(5,30) DXSTAT(1)

00016 40 FORMATT(1) ATTACH ERROR: INSB VALUE= '06, ' 00017

00018 GO TO 80

00019 DO 100 ATTACHED, INITIALIZE

00020 CALL CLEAR(DEFINAD)

00021 CALL CLEAR(DEFINAD)

00022 CALL CLEAR(DEFINAD)

00023 CALL CLEAR(DEFINAD)

00024 CALL DATE(TACH(1))

00025 CALL LOG(TACH(1))

00026 CALL GETADDR(TIPARM(1), BUF)

00027 DAPARM(1)=TIPARM(1)

00028 CONTINUE

00029 TIPARM(2)=RUFLEN

00030 CALL SUBROUTINE(1, TLOG, EFITM, ITSTAT, TIPARM, IDS) ! ISSUE READ TO IT:

00031 CALL AFLOREHEAD, EFWRIT, EFETER, EFEXIT, EFITM) ! WAIT FOR AN EVENT

00032 DETERMINE WHICH EVENT OCCURRED

00033 CALL READ(1, EFITM, EFWRIT)

00034 IF (EFWRIT.NE.0) GO TO 100

00035 CALL ATOL(1, TLOG, 1, ITSTAT) ! CANCEL READ TO IT:

00036 CALL READ(1, EFREAD, EFWRIT)

00037 IF (EFWRIT.NE.0) GO TO 100

00038 CALL READ(1, EFWRIT, EFWRIT)

00039 IF (EFWRIT.NE.0) GO TO 100

00040 CALL READ(1, EFETER, EFWRIT)

00041 IF (EFWRIT.NE.0) GO TO 100

00042 ASSUME EFEXIT (EXIT REQUEST) HAS BEEN INITIATED

00043 IF (TACH(2) .NE. 0)

00044 TACH(3)=2

00045 CALL ATOL(1, DVAL, DXTLOG, DXTSTAT, DAPARM, IDS)

00046 CALL LOG(TACH(1))

00047 DO 100 WRITE(5, 40)

00048 20 FORMATT(1) DA TEST PROGRAM IS TERMINATING \*\*\*

00049 CALL EXIT

00050 100 CALL CLEAR(DEFINAD)

00051 TIPARM(2)=RUFLEN

! IEM ISSUED READ TO DX

! READ UP TO RUFLEN FROM TT

Figure 3-1 (Continued)



(Continued)

PAGE 3

23-AUG-78

09:29:40

FORTRAN IV-STATUS 902-51

DATE: 8/17/78

```

0068 CALL LOG('IBM READ DX',11)
0069 GO TO 60
0070 108 CALL CLEAR(FITIN)
0071 IF (IDS.EQ.1)SUCJGO TO 120
C
0072 WRITE(5,110)IDS
0073 110 FORMAT(' *** READ IT ERROR: DIRECTIVE STATUS=',15,' *****')
0074 GO TO 70
C
0075 120 ISTAT=IAND(I1STAT(1),'377)
0076 IF (ISTAT.EQ.1)SUCJGO TO 140
C
0077 WRITE(5,130)T1STAT(1)
0078 130 FORMAT(' *** READ IT ERROR: IOSTR VALUE=',06,' *****')
0079 GO TO 70
C
0080 CALL LOG('REYBOUND',8)
0081 IF (I1STAT(2).GT.0)GO TO 160
C
0082 WRITE(11,150)
0083 150 FORMAT(' *** INVALID INPUT -- TRY AGAIN *****')
0084 GO TO 60
C
0085 160 CONTINUE
0086 DAPARM(2)=T1STAT(2)
0087 CALL #TUTOT(1045,DX100,,DASTAT,DIFARM,IDS)
C
0088 IF (IDS.EQ.1)SUCJGO TO 190
C
0089 170 WRITE(5,180)
0090 180 FORMAT(' *** DX I/O ERROR: DIRECTIVE STATUS=',15,' *****')
0091 GO TO 70
C
0092 190 ISTAT=IAND(DXSTAT(1),'377)
0093 IF (ISTAT.EQ.1)SUCJGO TO 60
C
0094 200 WRITE(5,210)DASTAT(1)
0095 210 FORMAT(' *** DX I/O ERROR: IOSTR VALUE=',06,' *****')
0096 GO TO 70
C
0097 300 CALL CLEAR(FWRITE)
C
0098 DAPARM(2)=0
0099 CALL #TUTOT(1045,DX100,,DASTAT,DIFARM,IDS)
0100 IF (IDS.EQ.1)SUCJGO TO 170
0101 IF (IAND(DASTAT(1),'377).NE.1)SUCJGO TO 200
0102 IF (DASTAT(2).LT.1)GO TO 60
C
0103 T1PARM(2)=DASTAT(2)
0104 CALL #TUTOT(1045,IT100,,T1STAT,ITPARM,IDS)
0105 GO TO 60
C
0106 CALL LOG('IBM CH IFRM OR IDU',19)
0107 19 IBM TERMINATED TO
0108 END

```

ORIGINAL PAGE  
OF POOR QUALITY

(Continued)

FUNCTION IV-PLUS V02-51

DATE 01-17-70

09:29:40 73-AUG-78

PAGE 4

/IPROCES/HR

## PROGRAM SECTIONS

| NUMBER | NAME          | SIZE | ATTRIBUTES      |
|--------|---------------|------|-----------------|
| 1      | SCODE1 001350 | 372  | R0, I, C0H, LCL |
| 2      | SPDATA 001062 | 13   | R0, D, C0H, LCL |
| 3      | SIDATA 001131 | 302  | R0, D, C0H, LCL |
| 4      | SVARS 000272  | 13   | R0, D, C0H, LCL |
| 5      | LUNO 000000   | 3    | R0, D, UVR, GHL |
| 7      | DIOMAC 000014 | 3    | R0, D, UVR, GHL |

## VARIABLES

| NAME  | TYPE | ADDRESS  | NAME  | TYPE | ADDRESS  | NAME  | TYPE | ADDRESS  |
|-------|------|----------|-------|------|----------|-------|------|----------|
| DAL00 | 102  | 4-000004 | EFEAT | 102  | 4-000052 | EFEAD | 102  | 4-000040 |
| EPRIT | 102  | 4-000050 | EPRIT | 102  | 4-000216 | IOATT | 102  | 7-000006 |
| IOH00 | 102  | 7-000000 | IOH00 | 102  | 7-000002 | ISSUC | 102  | 7-000012 |
| ITL00 | 102  | 6-000000 | ITL00 | 102  | 6-000002 |       |      |          |

## ARRAYS

## NAME TYPE ADDRESS SIZE DIMENSIONS

|     |     |          |        |    |      |
|-----|-----|----------|--------|----|------|
| 001 | 101 | 4-000054 | 000120 | 40 | (80) |
| 002 | 102 | 4-000004 | 000014 | 0  | (6)  |
| 003 | 102 | 4-000000 | 000004 | 2  | (2)  |
| 004 | 101 | 4-000114 | 000021 | 8  | (17) |
| 005 | 102 | 4-000024 | 000014 | 0  | (6)  |
| 006 | 102 | 4-000020 | 000004 | 2  | (2)  |

## LABELS

| LABEL | ADDRESS  | LABEL | ADDRESS  | LABEL | ADDRESS  | LABEL | ADDRESS  |
|-------|----------|-------|----------|-------|----------|-------|----------|
| 100   | 3-000000 | 200   | 3-000052 | 300   | 1-000120 | 400   | 3-000132 |
| 101   | 1-000106 | 201   | 1-000452 | 301   | 1-000514 | 401   | 3-000204 |
| 102   | 1-000010 | 202   | 1-000200 | 302   | 1-000670 | 402   | 3-000342 |
| 103   | 3-000116 | 203   | 1-001022 | 303   | 1-001056 | 403   | 3-000466 |
| 200   | 1-001144 | 210   | 3-000550 | 300   | 1-001206 | 400   | 1-001326 |

## FUNCTIONS AND SUBROUTINES REFERENCED

| CODE | DATE | EXIT | GETDIP | LOG | QIO | HEADEP | WFLOR | WTIOU |
|------|------|------|--------|-----|-----|--------|-------|-------|
|------|------|------|--------|-----|-----|--------|-------|-------|

TOTAL SPACE ALLOCATED = 003052 /HR

NO FOR INSTRUCTIONS GENERATED

(Continued)

FORTRAN IV-PLUS V02-51  
DATE\$1.FTH

09:29:58 23-AUG-78

PAGE 5

C1  
C  
C  
C  
C  
C  
C

DATE\$1/LOG

OUTPUT TIME FOLLOWED BY CHARACTER STRING

0001  
0002  
0003

SUBROUTINE LOG(STRING,N)  
LOGICAL(1) STRING(1),TIM(8)  
CURSOR/LINES/LOGON

C

CALL TIME(TIME) ; SYSTEM TIME

WRITE(6,10) LOGICAL(1),TIM(8)

10 FORMAT(1X,HA1,2A,<0>A1)

RETURN

END

0004  
0005  
0006  
0007  
0008

ORIGINAL PAGE IS  
OF POOR QUALITY

Figure 3-1 (Continued)

PROGRAM SECTIONS

| ADDRESS | NAME   | SIZE   | ATTRIBUTES |
|---------|--------|--------|------------|
| 1       | SCNDEL | 000150 | 55         |
| 3       | SIDATA | 000044 | 16         |
| 4       | SVANS  | 000012 | 5          |
| 5       | SIFOPS | 000002 | 1          |
| 6       | FUNDS  | 000002 | 1          |

ENTRY POINTS

| NAME | TYPE | ADDRESS  | NAME | TYPE | ADDRESS | NAME | TYPE | ADDRESS |
|------|------|----------|------|------|---------|------|------|---------|
| 000  |      | 1-000000 |      |      |         |      |      |         |

VARIABLES

| NAME | TYPE | ADDRESS  | NAME  | TYPE | ADDRESS  | NAME | TYPE | ADDRESS  |
|------|------|----------|-------|------|----------|------|------|----------|
| 1    | 1+2  | 4-000010 | LGLEN | 1+2  | 6-000000 | N    | 1+2  | 3-000036 |

ARRAYS

| NAME   | TYPE | ADDRESS  | SIZE   | DIMENSIONS |
|--------|------|----------|--------|------------|
| STRTNG | 1+1  | 4-000020 | 000001 | 0 (1)      |
| TR     | 1+1  | 4-000000 | 000010 | 3 (0)      |

LABELS

| LABEL | ADDRESS  | LABEL | ADDRESS | LABEL | ADDRESS |
|-------|----------|-------|---------|-------|---------|
| 101   | 3-000000 |       |         |       |         |

FUNCTIONS AND SUBROUTINES REFERENCED

TIME

TOTAL SPACE ALLOCATED = 000240

NO FOR INSTRUCTIONS GENERATED

DATA: 00000000

#### 4. DX11-B DEVICE HANDLER CONSIDERATIONS

This section describes operator commands and utilities associated with the DX11-B Device Handler.

##### 4.1 Assembling

The following command will assemble the DX11-B Device Handler source code;

```
MAC>DX, DX=DX
```

The assembly will produce the object file DX.OBJ and the list file DX.LST.

##### 4.2 Task Building

The following command file will build the DX11-B Device Handler task;

```
DX/PR/FX/-CP/-FP, DX=DX, [1, 1]EXEC.STB
/
TASK=DX....
UIC=[1, 1]
PRI=248
STACK=32
//
```

These commands will produce the task image file DX.TSK and the map file DX.MAP.

The command file can be executed by entering:

```
TKB>@filespecifier
```

##### 4.3 Loading/Unloading

The DX task must be installed before the DX11-B Device Handler can be loaded into memory. If the system is not saved with the DX task installed, enter the following command:

```
MCR>INS [uic] DX
```

where "uic" is replaced by the User Identification Code (UIC) which contains the file DX.TSK.

Once installed, the DX11-B Device Handler can be loaded into memory by entering:

MCR>LOA DX;

To unload the DX11-B Device Handler enter:

MCR>UNL DX;

This will remove the handler from memory and place the emulated device off-line to the IBM 360/370.

#### 4.4 System Generation

The following device specification should be given during system generation:

DEV=DX0, <0, 0, 0, 0> , 340, 4, 176200

This requires the DX interrupt vector to be at 340 and the DX CSR to be at 176200.

## 5. IBM CONSIDERATIONS

This section discusses subjects relating to IBM 360/370 procedures for communicating with the PDP-11/DX11-B.

### 5.1 Channel Considerations

The DX11-B is a Direct Memory Access (DMA) device which can place streams of data directly into PDP-11 memory at high speed. Therefore, the DX11-B should normally be attached to an IBM selector or block multiplexer channel.

### 5.2 Device Considerations

The DX11-B hardware and Device Handler are said to emulate an IBM 2848/2260 because all channel sequences associated with such a unit are supported. However, it is possible for the IBM to view the PDP-11 as another type of terminal if only the basic read/write capabilities of the terminal are used, and the read/write functions result in the same channel sequences as with an IBM 2848/2260.

The channel commands accepted by the DX11-B hardware and Device Handler are listed in Figure 5-1. All other commands will return Unit Check to the IBM 360/370.

## SUPPORTED CHANNEL COMMANDS

| <u>COMMAND (hexadecimal)</u> | <u>DEFINITION</u>      |
|------------------------------|------------------------|
| 0                            | TEST I/O               |
| 1                            | WRITE DS               |
| 2                            | READ MI                |
| 3                            | NO-OP                  |
| 4                            | SENSE                  |
| 5                            | WRITE LA               |
| 6                            | READ DS                |
| 7                            | ERASE/FREEZE CURSOR    |
| A                            | SHORT READ MI          |
| E                            | REQUEST ATTENTION TYPE |

Figure 5-1



## 6. PROBLEM CHECKLIST

This section is provided as an aid in identifying malfunctions in the DX system.

**Symptom:** The task DX. . . does not appear in memory after loading the driver.

**Checklist:** Check the DX display light labeled ONLINE. If this light is off, the DX could not be placed on-line to the IBM 360/370. In this situation the DX11-B Device Handler (DX. . .) exits during the initialization phase.

Verify that the IBM system is up.

Verify that the switch at the front bottom left of the DX11-B is set to the enabled position.

Verify that the DX11-B is cabled correctly to the IBM channel.

**Symptom:** Unable to attach DX11-B.

**Checklist:** Verify that the task DX. . . is loaded into memory. If not, load the DX11-B Device Handler (LOA DX:) and check for the symptom described above.

Verify that another task is not attached to DX11-B.

**Symptom:** QIO read request to DX11-B never completes.

**Checklist:** Check the DX light labeled DNT0. If lighted, the application program did not respond to an IBM read or write event flag within the required time period.

Verify that the correct event flags are being waited upon.

Verify that the application program is processing the data to/from the IBM in an expeditious manner.

Check the DX display light labeled ONLINE. If not lighted, the IBM 360/370 has probably had a system failure.

**Symptom:** QIO write request to the DX11-B never completes.

**Checklist:** Check the DXTO display light as specified in the previous checklist.

Check the ONLINE display light as specified in the previous checklist.

Verify that the required IBM software is up.

Verify that the IBM software interprets an attention code of octal 40 as a keyboard attention.